LISTing Newsletter

Newsletter of the
Long Island Sinclair\Timex
Users Group

Incorporating NYTSE

January, 1988

"SPECIAL TECHIE ISSUE"

IN this issue: hardware projects, and MC programming...why? Find out by reading 'Newsletter Newsnotes'.

NEXT MEETINGS: IMPORTANT!

The GUY FROM TIMEX! OFFICER ELECTIONS! DUES DUE!! All at Harvey's house, Feb. 21. Call 516-791-6247 for more info. PLEASE NOTE: Meetings are 3rd Sunday + Mon. in Feb. NYTSE meets Mon. Feb. 22, 7PM, Miss Kim's, Park Ave. S., between 21st and 22nd St.

L.I.S.T.
5 Peri Lane
Valley Stream, NY 11581

TO:

FIRST CLASS MAIL
DATE MEETING NOTICE
Please DON'T delay!

LISTing Listing
Please send submissions to:
Joe Newman, 325 W. Jersey St., #2D, Elizabeth, NJ 07202
or send items for the LIST group to: LIST, Harvey Rait
5 Peri Lane
Valley Stream, NY 11581
PLEASE NOTE THE NEW LIST ADDRESS
yearly LIST dues- $15

URGENT BUSINESS!!!

ONE- it's time to elect new officers of LIST. Show up at the February meeting if you wish to participate in the election process- hopefully to become an officer!

TWO- most important- DUES ARE DUE! Send in your yearly dues NOW! Keep the TS spirit alive! Support your systems- support LIST. Make $15 checks or money orders payable to LIST.

NEWSLETTER NEWSNOTES

Why a 'technical issue'? Well the main reason is that I'm stuck with the Editor's Dilemma again- yep, no more articles. Oh I have a few, but they're more hardware projects. So bust out the Tasword, fire up the Quill, or if you must- ink up the pen and SEND IN SOME MORE ARTICLES! I truly thank all of you who have submitted and continue to submit articles. On the most part the articles have been of top quality- keep up the good work!

As for the meetings- as the front page says "The man from TIMEX will be at the Feb. meeting"!!! Actually he is Mr. Skyrme, President of the American office of Psion, Inc. His purpose is to show off the Psion Organizer devices, but we know better. We'll let him show us his gadget, then we'll zap him with those TS questions! Mr. Skyrme was the Product Development Director for the 2068 at Timex.

Mr. Skyrme is also scheduled to speak at the upcoming Trenton Computer Fair. He will be speaking at our T/S representation, scheduled for April 23 in the afternoon. As in previous years, our groups will be present at the fair to show Sinclair is still going good. This fair draws T/S people from up & down the east coast, so make plans to attend...April 23 & 24.

Myles is doing well, and may make it to the March meeting. If any of you tried to contact him at the address printed in the last issue, my apologies if you had any trouble reaching him. Myles is no longer at that particular spot. Last I know he was in the V.A. Hospital, 1st Ave. and 24th Street, ward 8 North, Bed 24.

If anyone is interested in using a bar code reader with the QL, please contact me. I have a working point-of-sale database system for the QL, which is used with a bar code wand. I also have completed a program which can print bar code labels on an Epson compatible printer (i.e., the QL Printer, which uses double density bit graphics). The program can print bar codes of all upper case alpha characters and the numbers. By the way, the p-o-s program is a full featured program comparable with those on 'other' machines. Also, I have a cash register inventory program for the 2068, and plan to release one for the QL which does not require the bar code wand, and also a generic bar code database which can be customized by the end user for a variety of applications. Again, contact me if you're interested.

Bill Jones of the TS-2068 Update says he needs a Telecomputing writer and someone to keep going with extra memory programming for the 2068. Contact him if you'ld like to get involved at:
TS-2068 Update
1317 Stratford Avenue
Panama City, FL 32404

AN LED FOR YOUR 2040

A common complaint of many TIMEX equipment owners is the lack of a power on LED (light emitting diode) on the equipment. The following paragraphs describe how to add a LED to a TIMEX 2040 or ALPHACOM 32 thermal printer. It is a simple project but be advised that the author and the LIST GROUP are not responsible for any damage you may do to your equipment.

The parts required for this project are a LED of your choice (almost any color or size will do as long as it will fit into the printer's case), one 470 ohm 1/8 to 1/2 watt resistor, a short length of "telephone" or wire wrap wire and a bit of rosin core solder. The tools required are a Phillips head screwdriver, wire cutters or knife, a small soldering iron and drill for the LED mounting hole.

The first step is to open the printer's case. To do this remove the paper from the printer, turn the case over and remove the four screws holding the two halves together. Turn the printer upright and lift the top off. The PC board and printer mechanism should remain attached to the bottom of the case. Next drill a hole to mount the LED. The front right hand corner of the case seems appropriate but it can be mounted anywhere there is room inside for the the LED's leads. Be sure the case will close BEFORE you drill, as the saying goes "Measure twice, cut once.".

Once the case is prepared, the LED and resistor can be connected. Refer to FIGURE ONE for the connection locations. Solder one end of the 470 ohm resistor to the jumper wire marked "W2", then a length of wire long enough to reach the mounted LED should be soldered to the other end of the resistor. Solder the end of this wire to the anode of the LED. The anode lead on round LED's has a small flat spot next to it on the "mounting rim". If you are unsure of the proper connection, solder it to either lead. Now solder a length of wire from the remaining lead to the right side of diode 5 on the PC board (marked D5). Connect the power to the printer with the cover off to test the LED. If the diode fails to light with the connections complete, unsolder the two wires to the diode's leads, switch them around and solder again. Test the LED again by connecting the power. If it still fails to light, check the solder joints for a proper connection or replace the diode in case it is defective.

The last step is to reassemble the case. Close the cover making sure none of the wires will interfere with the printer mechanism, the switches or mounting screws. Reinstall the four screws taking care not to strip the plastic threads in the case. Insert the paper and the printer is ready for use.

J.M. Ball

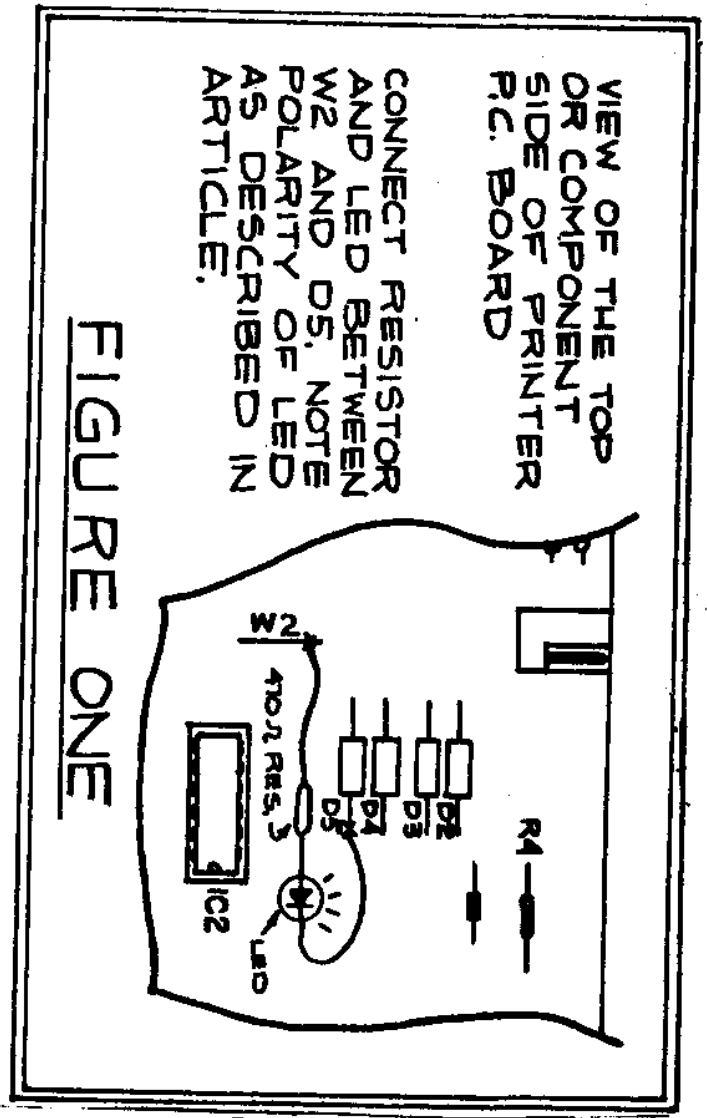
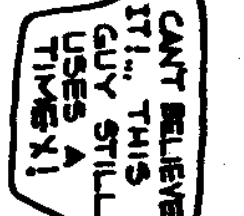


FIGURE ONE



MAKING CODE RELOCATABLE

by J. Leary

Most machine code programs for T/S computers will only run from a single location in RAM. This is because programs usually have absolute addresses imbedded in them, and is a source of frustration. If 2 peograms overlap, for example, they can't both reside in memory, and so can't both be used.

Here is one way of dealing with the problem.

The program MR1BT (Make Relative-1 Byte) will modify another machine code program so that it will run at any location in RAM. It is only 60 bytes long but requires you to construct a data table.

The approach is that in a program with many jumps, calls and loads to/from absolute addresses, most such locations will be less than 256 bytes apart. A table of 1-byte offsets can be used to store these separations.

Because offsets are at least 2 bytes apart, 00 and 01 are free to be used as flags: 00 signals end of table and 01 marks a 2-byte offset. (see next paragraph)

There is a penalty to be paid if successive locations are more than 255 bytes apart. The table must then contain 3 bytes for this next location:

01 to warn 2-byte offset coming
2-byte offset (LO-byte first).

Your program must be entered by a USR call from Basic, so that the address called is in the BC register. I believe all Timex/Sinclair computers are alike in this respect.

Proceed as follows:

1. Prefix your program with the table constructed as follows:

   1st 2 bytes-starting address of your program including my MR1BT.
   next bytes-offsets as described above; 1 byte for locations < 256 bytes apart; 3 bytes for locations more than 256 bytes apart.
   last byte-00 to mark end of table.

2. Prefix the table with the MR1BT program below. If your program does not run from its first byte, insert a jump to the running address at the end of MR1BT. This will become the first offset in your table.

3. To relocate the program, load to any address a; then just RANDOMIZE USR a. (or PRINT USR a, whichever your program uses). All absolute addresses marked by the table are now adjusted to the new location. Also the address a has been put into the table (1st 2 bytes). And your program is up and running.

4. If you call various parts of the program from Basic, the calls will need adjusting. If you use a variable for the calls (with the value of a above), then you need make only one adjustment.

5. It is not easy to get all the offsets right. One error or omision and everything comes out wrong for the rest of your program. So MR1BT has no commercial prospects, and I offer it for free to the T/S Community.

MR1BT

```
ADDR OP CODE   Mnemonics       Commentary
-------------------------------------------------------------
C000 C5        PUSH BC          SAVE USR CALL
C001 213D00    LD HL,003D
C004 09        ADD HL,BC       ADD OFFSET TO USR CALL
C005 4E        LD C,(HL)
C006 23        INC HL          1ST 2 BYTES OF TABLE INTO BC;
C007 46        LD B,(HL)         THIS IS THE OLD USR CALL
C008 2B        DEC HL
C009 E3        EX (SP),HL
C00A E5        PUSH HL
C00B AF        XOR A            CARRY FLAG=0
                                x=DIFF. OF 2 USR CALLS;ALL ABS.
C00C ED42      SBC HL,BC          ADDRESSES MUST BE ADJ. BY X
C00E C1        POP BC
C00F E3        EX (SP),HL
C010 71        LD (HL),C       PUT NEW USR CALL IN  1ST  2  BYTES
C011 23        INC HL             OF TABLE;THIS FEATURE MAKES
C012 70        LD (HL),D          PROPER RELOCATION AUTOMATIC
C013 23        INC HL          LOOP STARTS HERE
C014 7E        LD A,(HL)       A=NEXT TABLE ENTRY
C015 5F        LD E,A
C016 FE00      CP 00             IF 0, END OF TABLE;JUMP TO YOUR
C018 281F      JR Z,C039          PROGRAM
C01A FE01      CP 01           1 BYTE PENALTY
C01C 2804      JR Z,C022          APPLIES
C01E 1600      LD D,00            DOED NOT APPLY
C020 1804      JR C026
C022 23        INC HL
C023 5E        LD E,(HL)       PUT OFFSET INTO DE
```

```
C024 23        INC HL
C025 56        LD D,(HL)
                              MAIN ADJUSTING ROUTINE
C026 E3        EX (SP),HL       PUT X IN HL & TABLE PLACE ON STACK
C027 EB        EX DE,HL          X IN DE;TABLE OFFSET IN HL
C028 09        ADD HL,BC         PROGRAM LOCATION (PL) IN HL
C029 4E        LD C,(HL)          CONTENTS OF PL, NEXT ADDRESS YO
C02A 23        INC HL              BE ADJUSTED (NA) IN BC
C02B 46        LD B,(HL)          I.E. NA=(PL)
C02C C5        PUSH BC           X  ON STACK
C02D E3        EX (SP),HL       NA IN HL;PL+1 ON STACK
C02E 19        ADD HL,DE         ADJUST NA
C02F EB        EX DE,HL
C030 E3        EX (SP),HL       X ON STACK;PL+1 IN HL
C031 72        LD (HL),D
C032 2B        DEC HL             PUT ADJUSTED ADDRESS
C033 73        LD (HL),E         INTO PROGRAM
C034 E3        EX (SP),HL       X IN HL;PL ON STACK
C035 C1        POP BC    !       PL IN BC
C036 E3        EX (SP),HL       X ON STACK;TABLE PLACE IN HL
C037 18DA      JR C013           LOOP
C039 D1        POP DE            EXIT TO RELOCATED PROGRAM;
C03A E9        JP (HL)              (IF NEEDED ENTER AN
C03B 00        NOP                    ABSOLUTE JUMP IN THESE
C03C 00        NOP                    LAST 3 BYTES)
```

Here is an example of how it works. Consider this little program which prints a text (not shown).

```
F000                    (256 BYTES OF TEXT)
F100  FF                END OF TEXT
F101  2100F0           LD HL,F000
F104  7E                LD A,(HL)
F105  FEFF              CP FF
F107  2804              JR Z,F10D
F109  D7                RST 10h
F10A  23                INC HL
F10B  18F7              JR F104
F10D  C9                RET.
```

To make this program relocatable, note there is only one absolute address, and the text must be jumped over. The table will be 7 bytes long, 2 for the new start, 1 byte offset to the jump, 3 byte offset to the address at F102, and 00 to end the table.

Add the 7 byte table to the 60 byte MR1BT program and you get 43h. So MR1BT is located at F000-0043=EFBD. At EFF6, a jump to F101 must be inserted (else JP (HL) puts you in a crash at F000, the text). The first offset is EFF7-EFBD=003A, and the next is F102-EFF7=010B.

Here is how your relocatable program looks:

```
ADDR OP CODE  MNEMONICS        COMMENTARY
-------------------------------------------------------------

EFBD C5         PUSH BC          START OF MR1BT
....
EFF5 C301F1     JP F101          JUMP OVER TEXT
                START  OF  TABLE
EFF9 BDEF       start address,lo byte first
EFFB 3A         1st offset
EFFC 010B01     2-byte offset,lo byte first,with 01 flag
EFFF 00         end of table
F000-F10D     PROGRAM AS ABOVE
```

****
* USER DEFINED GRAPHICS, REVISITED! *
****

BY CEDRIC R. BASTIAANS

My article "USER DEFINED GRAPHICS MADE EASY" (LISTing of September '87 and HATS of October '87) requires a few further observations...

(1) When the program has been loaded and it runs, one of the first messages on screen is that the UDG's cannot get lost by such commands as NEW, CLEAR, SAVE or LOAD. Even though this is true, it might suggest that the UDG's can be SAVEd!
The only way to SAVE UDG's is by the method shown in the second page of my article, by DATA, READ and RESTORE commands.

(2) Then, Basil Wentworth brought to my attention that it is possible for the program to run into a snag. That happens when the BLACK SQUARES occuring in program lines 120, 210 and 230 are constructed by:

INVERSE or INVERSE VIDEO "space"

Should you have done this, you will have noticed that you can't progress beyond line 120, since you will get the error message:

K Invalid color, 120:3

I would never have thought of using any of the above commands to make a black square, so I never ran into this problem. Two correct ways of making a black square are:

(a) GRAPHICS shifted 8 (then undo the graphics mode)
or
(b) CHR$143

Method (a) is by far the easiest.

I hope that you have not been discouraged by any such problem; try the program and you will find that it is the easiest way yet to make UDG's!

* * *

ZX81/TSXXXX OUT-BOARD REAL-TIME CLOCK
by Tim Stoddard

The following is a description of the Real-Time clock section of the D.A.M. board article which appeared in Time **Designs Magazine** (March/April '87 page 23). The board features a full-function real-time clock with battery back-up and is mappable into eight I/O port blocks. See attached schematic diagram.

8255 PPI

The 8255 PPI is used to interface the MSM5832 clock to the Z80 buss. This is needed because the MSM5832 is too slow of a device to attach directly to the Z80 buss.

The 8255 has three ports called "A", "B", and "C". The module uses port "A" to xfer data to the MSM5832, port "B" to select the proper register in the MSM5832, and port "C" to toggle the control signals to the MSM5832. These three ports are accessed by writing or reading one of four registers in the 8255. Port "C" is also bit-addressable by writing a special code via the CONTROL register. This allows us to toggle a single control signal to the MSM5832 without having to "remember" what state the other three MSM5832 control signals were. The following is the table showing which registers control what in the 8255:

REGISTER	PORT
0	A
1	B
2	C
3	CONTROL

The first action that should occure in your BASIC or machine language routine is to initialize the 8255 by clearing port "C" and then setting up the 8255 to write, or read the MSM5832 clock chip. This is done via register 3; the CONTROL register. To write to the MSM5832 you need to initialize the 8255 so that ports A, B, and C are all "output" ports. This is done by writing the control register in the 8255 with an 80_{HEX} (128_{DEC}). To read the MSM5832 we'll need to initialize the 8255 so that port A is an input port and ports B, and C are output ports. This is done by writing the CONTROL register in the 8255 with a 90_{HEX} (144_{DEC}). A one-time action after powering up the computer is to initialize the 8255 (to read or write the MSM5832) then "clear" port "C" by writing a ZERO to register 2. This resets the active-high control signals HOLD, RD, and WR to the MSM5832, and causes the MSM5832's CS to go active via the inverter.

The 74HC138 is used to select a "block" of I/O ports to be used with the clock module. The HEX address of the ports always end in 3, 7, B, or F. So if the 74HC138 is strapped

for "block five", the I/O ports would be 53, 57, 5B, and 5F for 8255 registers 0, 1, 2, and 3, respectively. The following table summerizes the relationships:

8255 PORT	8255 reg ADDRESS	TIMEX HEX	TIMEX DEC	MSM5832 FUNCTION
A	0	53	83	DATA port
B	1	57	87	REGISTER ADDRESS port
C	2	5B	91	CONTROL port
CNT	3	5F	95	----------

The above table assumed a "block" of 5. You can re-strap to any of the eight blocks to avoid conflict with other devices attached to your computer.

We use a special function in the 8255 that allows us to change single bits in port "C" rather than "remembering" what all the bits should be in port "C". This is done by writting a special code via the 8255's CONTROL port $5F_{16}$. The syntax of this code is as follows:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	X	X	X	SR

SELECTED BIT
000 = 0
001 = 1
etc.

1 = SET
0 = RESET

MSM5832 CLOCK CHIP

The following table describes the various registers in the MSM5832 and their limits:

REGISTER ADDRESS	COUNTER	DATA I/O D3	D2	D1	D0	LIMITS	NOTES
0	S1	X	X	X	X	0 - 9	1
1	S10		X	X	X	0 - 5	1
2	MI1	X	X	X	X	0 - 9	
3	MI10		X	X	X	0 - 5	
4	H1	X	X	X	X	0 - 9	
5	H10	+	+	X	X	0 - 2	2
6	W		X	X	X	0 - 6	3
7	D1	X	X	X	X	0 - 9	
8	D10		+	X	X	0 - 3	4
9	MO1	X	X	X	X	0 - 9	
A	MO10				X	0 - 1	
B	YR1	X	X	X	X	0 - 9	
C	YR10	X	X	X	X	0 - 9	

NOTES

(1) Register set to zero when written to.

(2) D3=1 for 24hr or D3=0 for 12hr clock
D2=1 for PM or D2=0 for AM

(3) Days from Sunday. Sunday = 0, Monday =1, etc.

(4) D2=1 for leap year.

AN EXAMPLE

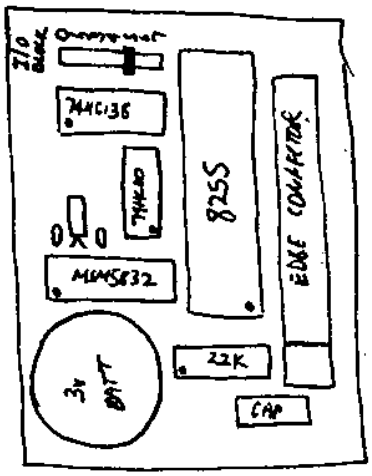
The following is an example showing how to read the day of the week from the clock module. Assume the module is mapped in block #5 (ports 53, 57, 5B, 5F).

(1) After powering up the computer write a 90_{16} to the 8255 CONTROL port, $5F_{16}$. This sets up the module to read the MSM5832 clock chip.
(2) As a one-time operation clear port "C" in the 8255 by writing a 0 to port $5B_{16}$. This need only be done one time after powering up.
(3) Write the desired MSM5832 register address to port "B" of the 8255 by writting a 6 (6 = day of the week)to port 57_{16}.
(4) Strobe the MSM5832 RD signal active by writting a $0B_{16}$ to the 8255's CONTROL port $5F_{16}$.
(5) Read the day of the week by executing an input instruction on port 53_{16}.
(6) Return the MSM5832 RD signal inactive by writting a $0A_{16}$ to port $5F_{16}$.
(7) You can now read any other MSM5832 register by following steps 3, 4, 5, and 6 using the desired MSM5832 register address in step 3.

To change the day of the week to Saturday (6):

(1) Initialize the 8255 to write the MSM5832 by writting an 80_{16} to the 8255's CONTROL port $5F_{16}$.
(2) Select the day of the week register in the MSM5832 by writting a 6 to port 57_{16}.
(3) Latch the new day of the week in the 8255's port A by writting a 6 (Saturday) to port 53_{16}.
(4) Store this new data in the MSM5832 by toggeling the WR signal. This is done by writting a $0D_{16}$ to port $5F_{16}$. Then imediately follow by writting a $0C_{16}$ to port $5F_{16}$.
(5) You can now change any other MSM5832 register by writting the new register address to port 57_{16}, latching the new data via port 53_{16}, and toggling the MSM5832's WR signal as in step 4.

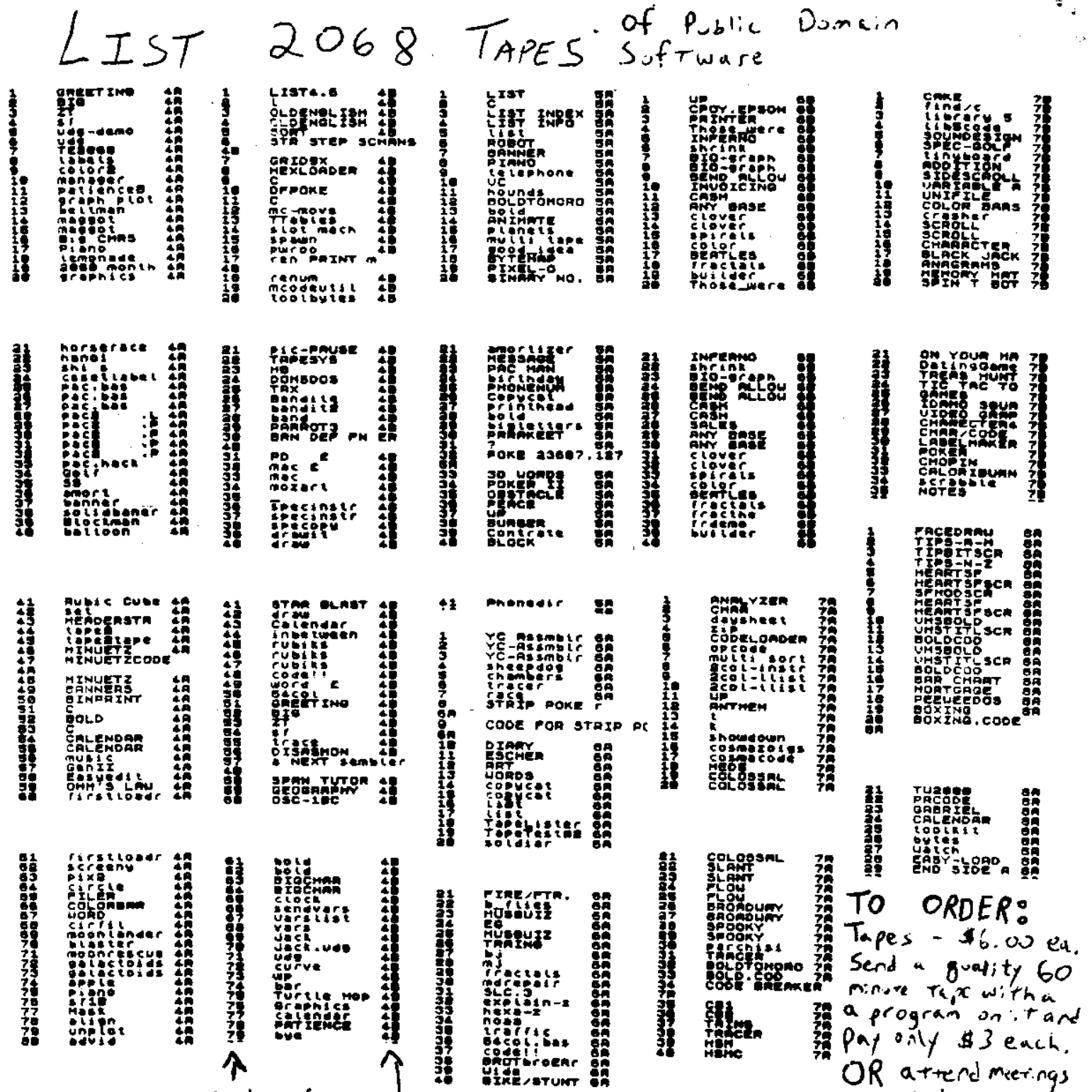
ZX81/TSXXXX OUT-BOARD CLOCK MODULE



8255 ADD	8255 REGISTER	TIMEX HEX	TIMEX DEC
0	A	53	83
1	B	57	87
2	C	5B	91
3	COUT	5F	95

CONTROL PORT MSM5832 OPERATION	SET-UP DATA TO INIT 8255 PORTS
WRITE	80_H 128_{10}
READ	90_H 144_{10}

LIST 2068 TAPES of Public Domain Software



number of program on tape

Cassette + Side Number i.e. - Tape #4, Side B

LOOK

Tape 9 and QL Tapes listed in next issue.

TO ORDER:

Tapes - $6.00 ea.

Send a quality 60 minute Tape with a program on it and pay only $3 each.

OR attend meetings and pick up tapes for $1.50 each!

PLEASE let Harvey R. know in advance which Tape(s) you want.

Make checks payable to L.I.S.T.

send orders to:

Harvey Rair
5 Peri Lane
Valley Stream, NY 11581

Listings made with "multitape" from Tape #5 A, program 16.

Where Tape 1, 2 or 3 and side 5 B?!